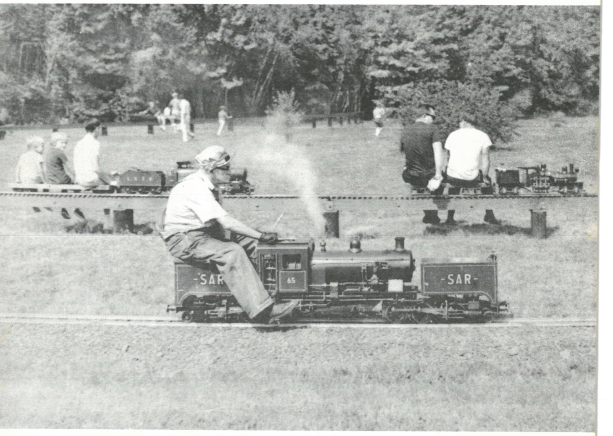
OCTOBER
1968
45¢

Live Steam

THE MONTHLY MAGAZINE FOR ALL LIVE STEAMERS AND LARGE-SCALE MODEL RAILROADERS



LIVE STEAM MEETS DURING THE SUMMER

LIVE STEAM LOCOMOTIVE CONSTRUCTION

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SUBSCRIPTIONS start with January, May or September issue: $4.50 per year in U.S.A. and Canada (U.S. Funds), $5.50 per year (U.S. Funds) in other countries.

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Address all mail to

LIVE STEAM
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SECOND CLASS POSTAGE PAID AT CADILLAC, MICHIGAN.

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NJLS Fall Meet

by Lawrence B. Green
President, New Jersey Live Steamers

Photos by C. H. Slayton
NJLS PLS

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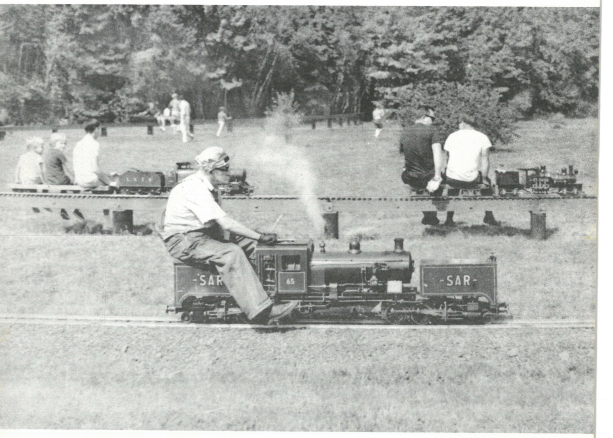

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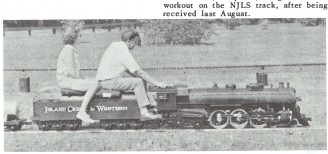


The boys at the *New Jersey Live Steamers* have weathered another meet, and (as the tone of the lead line might indicate) herein lies a tale!

The Annual Fall Meet was scheduled for September 20, 21 and 22 – with Saturday, the 21st, being designated as "Carl Purinton Day."

Friday was very busy with almost 100% of the attendance Live Steamers, enjoying the conversation and activity at the track.

Saturday, however, was a different matter! The facilities were swamped by a crowd, many of them apparently uninvited. The narrow road serving the neighborhood in which the club is located was lined with parked cars and at times completely blocked. People and kids were everywhere and the club facilities were extremely overtaxed.

On Sunday morning the Township Commissioner showed up and informed us that such goings-on were in violation of the zoning ordinance since the club grounds are in a rural residential area. Furthermore, the trailers and campers that we have been accommodating were not allowed to be used in the township. He advised that affairs such as our meets had become could not continue.

The NJLS Board of Directors met and decided that future meets will be for Live Steamers only and admission will by by written invitation. The general public will not be admitted although non-member guests may visit the club on other dates at the invitation of a member. Most regrettable, though, is the restriction on travel trailers and other mobile home equipment which can no longer be accommodated, but we have no choice in this matter.

But all was not gloom!!!

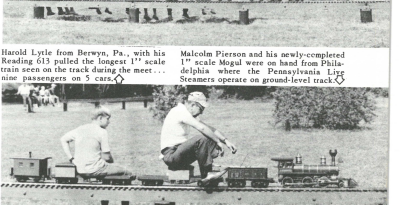
At exactly three o'clock on Saturday afternoon, the members found themselves mysteriously congregating in the club's Machine Shop in company with the Guest of Honor, Carl Purinton and his wife, Mary! On behalf of the regular membership of the NJLS, Club President Larry Green presented the Purintons with an engraved silver iced tea pitcher in appreciation of the hospitality shown to visiting Live Steamers at their home track in Massachusetts. A plaque was then presented to Carl commemorating his 36 years of service to the Live Steam hobby in this country and inscribed with the names of the regular members of the NJLS.

After a few words were exchanged by all, Carl was presented with an Honorary Membership in the *Pennsylvania Live Steamers* by Adrien Buyse.

"CARL PURINTON DAY" was a great day!

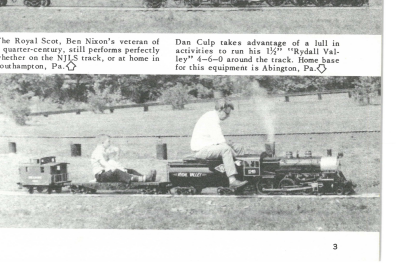
Harold Lytle from Berwyn, Pa., with his Reading 613 pulled the longest 1" scale train seen on the track during the meet... nine passengers on 5 cars.

Malcolm Pierson and his newly-completed 1" scale Mogul were on hand from Philadelphia where the Pennsylvania Live Steamers operate on ground-level track.



The Royal Scot, Ben Nixon's veteran of a quarter-century, still performs perfectly whether on the NJLS track, or at home in Southampton, Pa.

Dan Culp takes advantage of a lull in activities to run his 1½" "Rydall Valley" 4–6–0 around the track. Home base for this equipment is Abington, Pa.



Ontario Live Steamers Attend

Opening of Edward Phipps-Walker's Multi-

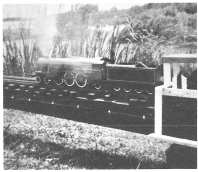
August 11th, 1968 . . . a date to be remembered by Live Steamers as the day of the last regular run of a steam locomotive on the British Railways . . . also marked the beginning of a new phase of activity in the Live Steam hobby. On that date Live Steamers from the Frontenac Model Railroaders in Kingston, Ontario, gathered with others from Toronto, Peterborough and Ottawa to officially open the new multi-gauge track at the summer home of Edward Phipps-Walker near Gananoque, Ontario.

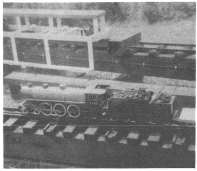
The unique elevated track consists of six rails which will accommodate 8, 7¼, 5, 3½, 2½ and 1¾" gauge equipment and is planned for extension in the future. It is designed to handle locomotives of visiting Live Steamers as well as the several pieces of equipment in Phipps' personal collection.

Participating in the Official Opening Day Run were (l to r) a 3½" gauge *Heilan' Lassie* rebuilt by Wm. T. Palmer of Thrussington, Leicestershire, England and now owned by Phipps. This engine holds the track record at the Nottingham (England) Model Engineering Society of 20 m.p.h. with five passengers and Mr. Palmer often ran as long as five hours continuously.

Doing honors on the 2½" track was a ½" scale *Fayette* built by H. McLarnon of Peterborough, now owned by Peter Harrell of Kingston.

Other ¾" scale equipment at the run were Raymond Corley's *Rob Roy* and Henry Moxley's CPR 0–6–0 #2101, both from Peterborough.





FOUR PHOTOS BY PETER HARRELL

ROCHESTER AREA CLUB

The call is out for Live Steamers in the Rochester area of New York State interested in forming a Live Steam club.

James V. Wright, who is building LBSC's 2–10–0 *Evening Star* design, would like to have others contact him with the hope of organizing a club. The club might be called the *Genesee Valley Live Steamers* and include the Rochester and Finger Lakes region. Jim is aware of ¾" and 1" scale equipment in the area, but 1½" scale builders should make themselves known, too.

James V. Wright, 36 Barnfield Road, Pittsford, N. Y. 14534 is the one to contact if you are interested in joining other Live Steamers in that area and his phone is 716 – 334-4619.

PROGRESS REPORT ON JT&S

The Joshua Tree & Southern R. R. Club continues to make great strides in their operation.

With club meetings and breakfasts in their air-conditioned dining room and lounge (ex-D&RGW diner, *Castle Peak*) parked at the Santa Fe depot in San Bernardino, California, they conduct business and make plans for work sessions at the track site.

On July 29th, SP RPO car #5217 was delivered by the ATSF and coupled onto the *Castle Peak* at San Bernardino. This example of heavyweight equipment will be used for storage, displays and permanent bunks for 8 or 12 as well as space for the "Spit & Argue Club," complete with pot-bellied stove.

The club's caboose, ex-SP 529 is already in operation at the track site but was broken into and used as a camp during the month of September. Damage was slight – a broken window; but missing was one ATSF marker lamp and John Mueller's hat! The roof has been painted white to reflect the heat of the desert sun and the car makes fine headquarters for work parties at the track site. Bob Jones donated a U.P. caboose stove and John Mueller is fitting new lids.

Work is progressing on the surveying of the first ¾ mile of 15" gauge track with hopes high to begin laying rail this fall . . . spurred on by Tom Coffey's efforts in construction of his 15" gauge two-truck Shay.

The club is still looking for a resident caretaker and for new members. If you are interested contact Joel Tedder, 4241 E. Live Oak Ave., C–7, Arcadia, Calif. 91006.

PENSACOLA LIVE STEAMERS

Through public displays in February at Pensacola, in March at Foley, Ala., and at the Fair at Pensacola in October, the *Pensacola Live Steamers* have been publicizing the hobby and stirring up interest in their area.

They have secured a site of about an acre which is in the process of being cleared and work is being completed on the design of their track which will accommodate 4¾" and 7½" gauge equipment.

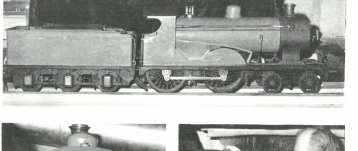
Club membership is open to all model engineers and interest presently includes several in stationary steam, a Case tractor under construction and a steam boat in addition to the locomotives under construction by several members

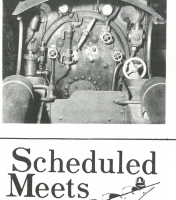
Their meetings are held the second Sunday of each month and an open invitation is extended to any Live Steamers who might be in the Pensacola area. For further information, contact Harrison H. Green, 5607 Glass Drive, Pensacola, Fla. 32505.

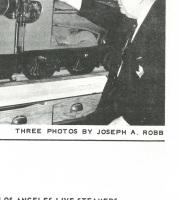
Gauge Track

Probably the most prized Live Steam locomotive in his collection is Phipps' 8" gauge 4-4-0 built in 1899 by the locomotive apprentices at the Great Central Locomotive Works at Neasden near London. It is a super-detailed miniature with inside cylinders and vacuum brakes, shown with its owner at the far right.

At the throttle of the first engine to run over the new track was British Industrialist Cecil Moore, President of Myford Engineering, Ltd., in Beeston, England.







THREE PHOTOS BY JOSEPH A. ROBB

A NEW LIVE STEAM CLUB IN TORONTO

A group of twelve Live Steamers from Niagara Falls to Oshawa, Ontario, have recently organized the *Toronto Live Steamers* with the first Friday in each month designated as "Club Night."

The club has, at present, the use of members' tracks for 3½" and 4¼" gauge and special meets will be announced as they are scheduled.

Secretary/Treasurer for the new group is Basil R. Dodd, 1158 Flagship Drive, Mississauga, Ontario. If you are interested in working with this club, drop him a note for more information.

NEW YEAR MEET IN FLORIDA

The New Year will arrive on steam in Florida as a group of Live Steamers plan to meet for a run on Enos Yoder's track in Sarasota on New Year's Day.

Track is available for running 3½" and 4¼" gauge equipment and a good

For further information, contact Enos W. Yoder, 1527 Ingram Avenue, Sarasota, Florida 33580.

Scheduled Meets

JANUARY

1 **FLORIDA LIVE STEAMERS**
New Year's Day Run
4¼" – 3½" gauges
Enos W. Yoder's track
1527 Ingram Avenue
Sarasota, Florida 33580

REGULAR RUN DAYS

GOLDEN GATE LIVE STEAMERS
Every Sunday, weather permitting
2½" – 3½" – 4¼" – 7½"
Ron Downer, Secretary
1274 36th Avenue
San Francisco, Calif. 94122

JAMUL VALLEY RAILROAD
3rd Sunday of each month
7½" gauge
Harry F. Haas
Route 1, Box 47A
Jamul, California 92035

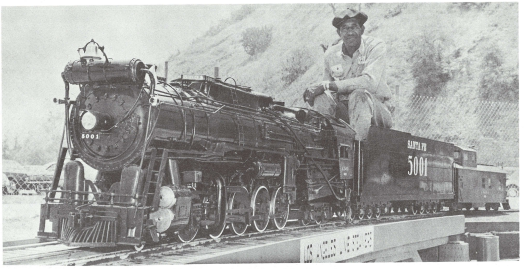
LOS ANGELES LIVE STEAMERS
1st Saturday & Sunday each month
3½" – 4¼" – 7½"
William Harper, Secy.
4 Rowhide Lane
Rolling Hills Estates, Calif. 90274

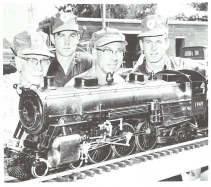
NEW JERSEY LIVE STEAMERS
1st & 3rd Sundays each month
3½" – 4¼" – 7½"
Ralph Green, Secretary
Phone 201 – 353-4424
845 Kilsyth Road
Elizabeth, N. J. 07208

RIVERSIDE LIVE STEAMERS
4th Saturday & Sunday each month
7½" gauge
Francis M. Smith, Secretary
P. O. Box 5512
Riverside, Calif. 92507

SOUTHERN CALIFORNIA LIVE STEAM CLUB
2nd Sunday each month
3½" – 4¼" – 7½"
K. G. Kegner, Secretary
2764 Maple
Rialto, California 92376

WAUSHAKUM LIVE STEAMERS
2nd Sunday each month 8 a.m.-4 p.m.
3½" gauge
Wendell C. Bishop, Secy.
52 Pond Street
Natick, Mass. 01760





One of the most spectacular new locomotives at the meet was Frank Mann's Santa Fe 2–10–4 in 1½" scale. It wasn't quite complete for hauling passengers but it was in operation. Talk about monsters . . . this is a beautiful one!

Three generations of Live Steamers — Bill Cooper, (left) the old master himself; son Albert (center) and grandsons Bill and Tom. The 4–6–2 in 1" scale is the pride of Albert and his two sons. Bill had his engine running, too.

Another Father-and-Son project is this 2–4–0 — a cut-down Harpur Mogul. The engineer is Donald Pergande and his father, Elroy, is the brakeman. The entire train is a work of art and operates on a tight-radius track at their home.

Last winter's projects make debut at

PHOTOS BY GENE HACKLEY

LALS SPRING MEET

by William H. Webb

The Los Angeles Live Steamers' 1968 Spring Meet was one of the most successful ever held from many different aspects. The meet is traditionally held over the Memorial Day weekend and since the holiday fell on Thursday this year, many railroaders and visitors also had Friday off from work resulting in a four-day holiday. Over the four days more than two thousand members, guests and friends registered at the club facility, and over 5,800 passengers from the general public were carried on various trains operating during the meet. Over sixty locomotives of various types and scales were registered, some from hundreds of miles away. Besides the ones usually seen at the LALS tracks were a few new ones (new since the last meet), some rebuilt locomotives and many other steam-operated machines.

For instance: Bob Gantz had a steam-driven pile driver (scale model, of course) and demonstrated the ability of the model by driving piles and stakes into place for retaining walls needed in expansion of the 1" scale tracks.

Another unique model on display at the meet was a gasoline driven pumping plant. A small one-lunger putt-putt was capable of circulating several thousand gallons of water from a tank elevated about a foot above the pump back into the same tank on less than a pint of gasoline!

Lots of attention, too, was on Doug Alkire's B & O Pacific featured in the June issue of LIVE STEAM. While the pictures of the engine were exceptionally good, so is the model and one must actually see it in operation to really appreciate the workmanship and love that has gone into the building of that engine!

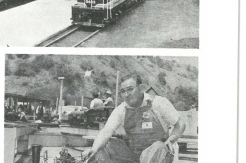
Several of the other newly-completed pieces of equipment at the meet are shown in Gene Hackley's pictures on these pages.

Enforcing club safety rules resulted in a couple of differences of opinion but everything worked out to the satisfaction of all concerned. Bob Julyan's 1½" 4–6–2 provided some exercise for the rerailing crew and Tom Crawford's portable bedroom was flooded when the water tank in his house trailer exploded, but outside of that everyone had a real good time.

Fred Wilcox displays his 1" scale railroad crane operating under steam. The crane is of the construction type rather than a wrecker. Fortunately, no wrecker was needed at the LALS Spring Meet – not on the 1" track anyway!

Chet Peterson now has four of his new Union Pacific passenger cars in operation and was responsible for hauling a high percentage of the 5,800 passengers during the four-day meet.

The old and the new – Bruce Ward heads out of the station siding with his 1½" INVICTA as Jack Bowlus holds the main with the diesels which he and his late father, William Bowlus, developed.



With his Case tractor all steamed up, Talley Estes had the pleasure of riding all over the park without worrying about the train ahead or whether the siding switch was properly aligned!

First anniversary meet on the

Palatine Lake Zurich & Wauconda Railroad

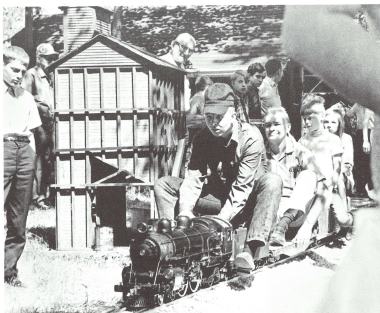
by Donald F. Bauer

From all around Chicagoland, Live Steamers and interested friends looked forward to August 11th . . . the date set for the First Anniversary Run on Frank Saville's 1" scale Palatine, Lake Zurich & Wauconda Railroad in North Barrington. The day dawned bright and sunny, a perfect setting for the celebration.

Activity started early in the steaming tracks to get the five locomotives ready for the day's running. In addition to Frank Saville's Little Engines 0–6–0 and 4–4–2 and his Nelson Gray Diesel there was Nick Schaub with his scratch-built 0–6–0 and the Bauers (Frank and Don) with their Little Engines 0–4–0T. An impressive display of 1" scale motive power for this special occasion.

Before the day was over, nearly 150 persons were in attendance. They came from all parts of Chicago as well as from Wisconsin and Iowa. Distance honors, though, went to Lloyd Proctor from Inkster, Michigan, and Austin Barr, Mid-west Secretary for the BLS, from Whitehall, Arkansas.

There were photos and patterns for the 1" scale articulated that Miles Snyder plans to build as well as Lloyd Proctor's 3½" *Tom Thumb* and some parts for the 2" scale narrow-gauge Shay that he has under way. There was lots of steam, activity, conversation . . . all the ingredients required to make a memorable Live Steam meet at the facilities of a most genial host, Frank Saville.



PHOTOS BY ROBERT SHIMER

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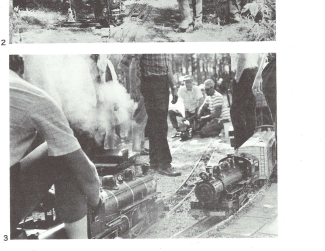


3

Pulling past a finely-detailed coaling tower with a full load of passengers, Jim Brossard heads Frank Saville's 4–4–2 out onto the main line. (1)

Bill McDonald eases out of the siding while some of the 150 or so in attendance wait their turn to ride. (2)

The engine terminal is a busy place with five engines in operation. Nick Schaub (background) readies his 0–6–0 as Frank Saville's 4–4–2 returns from another run, passing his 0–6–0 on another siding. (3)

PART ONE

VALVE GEAR

When a novice is looking at a locomotive in motion, particularly one with a Walschaerts, Baker, or Southern valve gear, the combined action of the crosshead and block at the lap and lead lever give the appearance of some magical motion. This combined motion when transmitted to the valve, give the same events that occur in the automobile engine; i.e. admission, expansion, exhaust, and compression, in different order. Unlike the 4-stroke cycle (Otto cycle) of the automobile engine that takes two revolutions to complete its cycle of events, the steam engine completes its cycle of events in one revolution of the crank-pin. Also, since the steam works alternately against both sides of the piston, it is referred to as "double acting." Hence, a double acting steam engine cylinder gives two power impulses per revolution, whereas a 4-stroke cycle gasoline engine cylinder will produce one power impulse per two revolutions. Since a single cylinder steam engine has two dead centers, front and back (top and bottom in a vertical engine), a single cylinder steam engine isn't always self starting. For this reason, two cylinders with cranks at 90° are used (sometimes three cylinders with cranks at 120°).

If it were not for the need of a reverse, and for providing a variable steam cut-off (to permit greater steam expansion, resulting in better fuel economy) a single eccentric would do. Where a single cylinder steam engine is used for steady load-constant-RPM stationary service, a single eccentric controls the valve where reverse is not a requirement. Since a locomotive has to start itself and pull variable loads at different speeds, and consider economy, it has to have the full treatment as far as valve gear is concerned.

There are many valve gears that can be used on locomotives. However, the ones that have been popular in America since about 1850 have been very few; i.e., the Stephenson that was universally used for about 50 years. It was displaced by the Walschaerts between 1905 and 1910. The Walschaerts was the popular valve gear until the late "teens" when the Baker came out. In the meantime, the Southern (a variation of the Baker) was used to some extent, while the Young was used on the Union Pacific. The poppet valves should be mentioned in passing, but since they are impractical for Live Steam, they will not be discussed here.

Most Live Steam novices would like to know which valve gear is the best. In this writer's opinion, (for Live Steam) they are all the best when properly made and installed, and the lousiest when they are made and installed in a sloppy manner. There isn't any noticeable difference in performance in any of them on Live Steam when they are well made. However, when wear is taken into consideration, the Baker and Southern appear to have a slight advantage when all parts are hardened. The critical point of wear on the Walschaerts is the link block (die block). The Stephenson has a favorable wear factor but the important thing that led to its going out of favor was its inaccessibility.

While there may be some minute differences in the timing of the different events with the different valve gears, the differences as shown on a "Valve Diagram" will be so small that for Live Steam they can be overlooked. With the exception of the Stephenson, the forementioned valve gears are "constant lead" valve gears. This means that regardless of where the reverse lever is in the quadrant, the valve (admission) is always open the same amount when the piston is on dead center. On the Stephenson, on the other hand, as the reverse lever is brought in the direction of center, the lead is increased. This makes for easier starting, since in full gear (reverse lever in the corner), the admission of steam doesn't start until the piston is on dead center. As speed increases and the engine gets control of the train, the engineer starts to hook up. In addition to earlier cut-off, the steam is admitted earlier (before dead center). The Denver & Rio Grande modified some of their Walschaerts valve gear freight engines to get this same effect. On Live Steam locomotives (since they are operated in full gear most of the time) it is advisable to give them about 1/32" lead when the engine is running in full gear. This lead will eventually disappear when wear takes place.

DEFINITION OF TERMS

Lap: The amount of valve extending beyond the port when the valve is centered over the ports.

Lead: The amount that the admission port is uncovered when the piston is on dead center.

Admission: That part of the stroke when steam is being admitted.

Cut-off: That point (percent of piston stroke) where the valve has just closed cutting off the admission of steam to the cylinder.

Expansion: That part of the stroke where the trapped steam expands against the piston between cut-off point and exhaust opening.

Exhaust: That part of the stroke where the trapped steam is being released.

Compression: That part of the stroke between closing off the exhaust and start-admission. It is considered good practice on prototypes to have the compression equal the steam pressure when the reverse lever is almost centered. This varies with the cut-off point as a function of the exhaust.

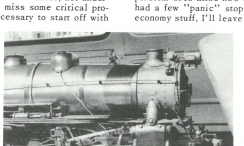
NOTE: Since a steam engine is a double acting engine, events are based upon piston travel and not upon degrees of crank rotation. This is due to the angularity of the connecting rod where, at half piston stroke, the crankpin is not 90° past front dead center, but somewhat short of that point. To partially compensate for this unequal condition, it has been common practice to make the main rods of freight engines (where pulling power and not speed is a consideration) longer than for passenger engines.

VALVE DESIGN

Most Live Steam engine builders are at a loss as to lap and lead since they can't get the same answer from any two people. After they understand what the terms mean, they then wonder how much of each they should have, and how they go about finding out. Many scale down prototype with indifferent success since, not understanding the fundamentals, they miss some critical proportion. In any problem, it is necessary to start off with certain assumptions and, when laying out a series of valve events, assumptions must also be made. These assumptions are: The total length of valve stroke in full gear; the point of cut-off; and the lead. Some Live Steamers use no lead and some give excessive lead to allow for wear, which, in a Live Steam locomotive, is all out of proportion to prototype. For our pupose here, a simplified version of the Zeuner Valve Diagram will be used. This simplified version of the Zeuner Diagram will give the Live Steam locomotive builder all he needs to know in order to design the various events into his valves. It is to be noted that the angularity of the connecting rods are not taken into consideration on the diagram. This is because this diagram is to show the basic events in regard to the piston and since the inaccuracies of crank circle timing are small in Live Steam, neither the crank circle nor the connecting rod arcs will be shown.

In the August, 1967 issue of LIVE STEAM, Henry J. Coventry had an excellent article on valve design, and, with his permission, this author will use some of his material. For practical purposes, the Zeuner Valve Diagram should be laid out to some multiple of the valve travel. For example: 8, 10, 16 or 20 times the valve travel. This will be called the Valve Circle. Assuming the port width is known, make the valve travel in full gear 3½ to 4 times the port width. The travel would be a scaled-down 6 to 8 inches. Prototype locomotive valve gears are designed for about 85% cut-off in full gear. For example: Two valve diagrams are laid out – one, a typical prototype diagram with 85% cut-off in full gear reduced in scale to 1" per foot; and the other one, with 75% cut-off in full gear. This second one is for Live Steamers who generally run their locomotives in full gear. In addition, excessive lead is added to compensate for wear. With this combination, the locomotive doesn't start as well as with the conventional setting when it is just out of the shop; however, as wear takes place, it will average out as well between overhauls as the 85% cut-off engine before wear takes place. It must be remembered that a few thousandths wear in all the pins in a valve train will eat up 1/32" lead in a hurry and also make all the events come later.

The ideal way to operate a train is to start out in full gear (85% cut-off). As the train reaches its running speed, the engineer opens the throttle and hooks the reverse lever up to where the train will maintain its speed and then controls speed with the reverse lever. This is fine for long runs, but where the layout is small and a few other trains are operating on the same track, a problem does arise now and then. After the engineer has had a few "panic" stops, he will say, "Enough of this economy stuff, I'll leave it in the corner and play safe!"



building the RARITAN

by William H. Morewood

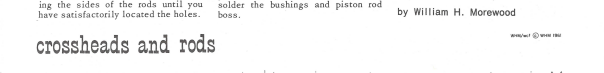
Wmbj/wcl © WHM 1962

crossheads and rods

It is important that the length between centers of the Side Rods (7–1) be within a thousandth or two of the distance between axle bearing centers. Proceed as shown on the drawings and carefully bore the second hole. Check the spacing by putting a shaft, with the end turned to just fit the holes in the side rod, in each set of bearings. The side rod should just fit on the shafts. If not, it would be best to get more stock and start over. You may save some time by not milling the sides of the rods until you have satisfactorily located the holes.

The first step in building the Crosshead Assembly (7–14) is to make up the side plates, piston rod boss and wrist pin bushings. Assemble the parts using one side plate with tapped holes and one with clearance holes. Note that the crossheads are right- and left-hand. The tapped side plate should, therefore, be on the left side of one crosshead and on the right side of the other.

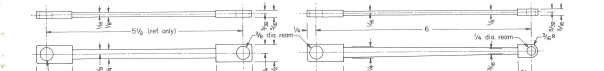
Put a spacer between the side plates, bolt them together and silver solder the bushings and piston rod boss.



note: locate other end on a pin in the front axle bearings, put a drill bushing in the rear axle bearing and drill this hole and ream to ⅜ dia. the length between holes must be the same as the distance between axle centers.

7-1 SIDE ROD
Cold Rolled Steel
2 required

7-2 CONNECTING ROD
Cold Rolled Steel
2 required



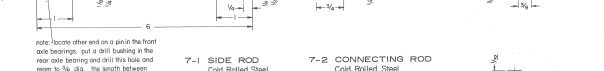
7-3 BUSHING
Brass or Oilite #F-312
6 required

7-4 BUSHING
Brass or Oilite #A-206-5
2 required

7-5 REAR CRANKPIN
Steel - 2 required

7-6 FRONT CRANKPIN
Steel - 2 required

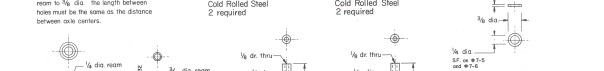
7-7 CRANKPIN WASHER
Brass - 2 required


¼ dia.
⅜ dia.
S.F. in #7-5
drill 2 clearance holes #32 (.116) in 2 side plates and drill 2 holes for 4-40 tap in other 2 plates. silver solder
4-40 tap 2 holes on left side of 1 crosshead and right side of other
10-32 tap
⅜ dia. ream
⅛

7-8 CONNECTING ROD SPACER
Brass - 2 required

7-11 SIDE PLATE
Steel - 4 required

7-14 CROSSHEAD ASSEMBLY
2 required



7-9 REAR AND 7-10 FRONT DRIVEWHEEL PIN
Steel - 2 req'd

7-12 BUSHING
Steel - 4 required

7-13 PISTON ROD BOSS
Steel - 2 required

mail stop

A WORD ABOUT THROTTLE CONSTRUCTION

I really should be embarrassed to find out that after running the 100% silver soldered stay tube throttle for eight years in one locomotive and for seven years in another that it "can't be done!" So, I removed the steam dome lid and, believe it or not, the steam collecting pipe was silver soldered to the throttle body! Actually the assembly was silver soldered and then straightened in a lathe since it must operate under tension. The boiler backhead was secured in position first, the throttle assembly was fed into position through the front end of the boiler barrel next, and then the front tube sheet was riveted in place. The fire tubes, stay tubes and stay rods were fed in through the front tube sheet. After the staybolts had been installed the boiler was ready for silver soldering. The steam collecting pipe may be screwed into the throttle body through the steam dome manhole. (Use Permatex sparingly on National Extra Fine Threads.) My respects to Mr. Martin Evans whose book *Model Locomotive Valve Gears* was one of those used as reference material in my chapter on "Valve Gear – it will be noted in the Bibliography.

In the May 1968 issue of LIVE STEAM (page 16) I referred to the smokebox superheater drawing shown in Chapter VIII as "really more of a dryer than a superheater and leaves something to be desired. However, the 2" that it steals from the boiler tubes on a 1" scale does help out, and the device gives no trouble whatsoever." In actual practice the exhaust doesn't have much character when the locomotive first leaves the steaming bay and goes out on the "Main," but after the train runs about an eighth of a mile the exhaust has taken on an air of authority. The water has to be carried quite high to get a wet stack that is common to many Live Steam locomotives that do not have some form of superheat.

Apparently those of us here in Southern California have never come across locomotives built by Mr. Evans or LBSC, which Mr. Evans claims have oversize firedoors. The ones in 3/4" and 1" scales that we get to see are beautifully built locomotives that have everything in scale with, perhaps, the firedoors somewhat over scale – but firing on the run was definitely a problem.

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STAINLESS STEEL BOILERS

With reference to the article "Miniature Boilers Of Stainless Steel" by Doug Alkire in the July issue of LIVE STEAM, I feel a word of warning is in order.

Boiler feed water containing even a few parts per million of chlorides will cause stress corrosion of 300 series stainless steels. Even if the boiler was stress-relieved after forming and welding it is under constant stress while operating.

This information came from metallurgists in the engineering research department of the power company where I am employed. I am about to build the boiler for an 0-4-2T in 1½" scale so I checked the article out with them. We never use stainless steel below the water level in our power plant boilers although it is used for tubes and pipes carrying steam. They said not to use any 300 series stainless steel as described in the article – they did say that Monel metal or 400 type stainless would be safe to use as they are not subject to stress corrosion.

I feel that some fellows will read the article, build a boiler as described and feed it tap water containing chlorine since Doug makes no mention of using dechlorinated water. I hasten to assure my good friend, Bob Maynard, that this is not a case of applying the big harness to the little horse as he so aptly put it!

ERIC CORBETT
4128 WEST POINT
DEARBORN HEIGHTS, MICH. 48125

(Eric Corbett's letter was forwarded to Doug Alkire for reply to avoid the time lapse caused by publication schedules. His comments are as follows:)

Word that tap water will quickly ruin a 300 series stainless boiler by stress corrosion is news to me. One thing I *do* know about stress corrosion is that there is still a great deal for science to learn about the subject and information on the subject is very rare in the ordinary reference books. Maybe the research staff in the power company really has something there and I would be glad to hear of the methods of analysis which were used to demonstrate the potency of tap water.

Actually, I used chlorinated tap water in my boiler only twice with heat during the leak testing before the first actual run. All other fills have been at the L.A.S. facility which theoretically has nothing but distilled water. Even *that* water has some sort of white material in it which collects at any point of seepage such as leaky packing glands on valve stems.

Since my wife has been using a Reverewear teakettle for years with tap water (and with no observable cracks) I begin to wonder what kind of stainless steel is used by Revere? I had always thought it was stainless of the 300 series. The only metallurgical handbook I have rates both 430 and 302 Stainless as subject to high rate of attack from saturated chlorinated water and 316 as slight corrosion but subject to pitting.

I have had a chance, though, to look through a few metallurgical handbooks of recent vintage, consult with Jon Olson and discuss the matter with several experts in stress, metallurgy and stress corrosion at the North American Rockwell Corporation where I work.

From *Metals Handbook* Vol. 1, 8th Edition, Dec. 1961, page 554 (published by the American Society of Metals):

STRESS CORROSION CRACKING

"Stress corrosion cracking failures in stainless steels have been reported in solutions that contain certain chlorides when high stresses (residual or applied) are present in the steel. Solutions of sodium, magnesium, calcium, zinc, or lithium chlorides and moist ethyl chloride

are among the most aggressive. Of these, a boiling concentrated solution of magnesium chloride is very aggressive and will cause the austenitic steels to fail from stress corrosion cracking in short periods of time (½ to 2 hours), when the applied stress is near the yield point of the steel.

"The corrosive environments causing stress corrosive cracking, which have been encountered in the chemical industry, are rather specific and are limited to chloride and caustic solutions.

"The failures of annealed and quenched alloys are usually transgranular, distinguishing stress corrosion cracking of these alloys from intergranular corrosion not requiring stress. Intergranular corrosion occurs particularly with austenitic alloys when they have been heat treated so that carbides precipitate at grain boundaries. Stress corrosion cracking of stainless steels does not depend on precipitated carbides.

"Ferritic stainless steels are reported free from stress cracking of the type induced by chlorides. They will pit badly under these conditions however. Experiments must be made to determine whether caustic will cause cracking of these grades. However, martensitic grades are known to crack under stress when exposed to chlorides.

"Stainless steels have higher corrosion fatigue limits than other steels."

I might point out that the 300 series stainless steel is generally in the austenitic class, but work hardening can convert it to at least partial martensitic type and it becomes a little magnetic. The 400 series is generally in the ferritic class. There are also some forms of austenitic which are heat-treatable but they are not in the 300 series.

Joe Nelson states, "I just don't know how to evaluate the 300 series chlorinated water problem since I don't know what the water engineers are using for a yardstick. However, I wonder if they are not thinking of a water tube boiler running at about 900 psig? A water tube boiler is sensitive to any impurities in the boiler at any temperature or pressure whereas a fire tube boiler can stand only a saturation of impurities. Also there is the time-under-steam factor involved. For an extreme situation the Live Steam locomotive may be under steam a maximum of 100 hours per year here in Southern California and only about half of that in the East during the first year of operation and gradually diminish to about one run every two years at the end of ten years. I am an exception . . . just look around the club and you will see what I mean. I have come in contact with the water experts and they talk in terms of the extreme condition way out on cloud nine and they don't come down to earth to take an evaluation of a conservative condition. I don't think that there is a problem in Live Steam boilers. Shouldn't the chlorine evaporate immediately and pass off with the steam?"

To answer Joe's last question I would like to state that without exception the experts I talked to agreed that chlorine (a gas) would, indeed, pass off as a gas and would not be harmful to a stainless steel boiler. One top metallurgist stated that the steam boiler running at 350°F temperature on tap water he would recommend ironed as first choice of material and type 321 or 347 stainless as second choice. All of those quizzed by me stated that chlorides were something to stay away from, but here again, there is no real knowledge of what goes on in stress corrosion and the only way to find out what works with a specific liquid is to build a sample boiler and try it. The experts know that slight impurities in a liquid can sometimes cancel out what would normally be a potential stress corrosion condition and a whole daisy chain of impurities can have a fairly unpredictable effect on the boiler unless the exact same conditions (not just *nearly* the same) have been encountered before. The previous cases can only serve as a guide. Look at the effect that only traces of certain elements have on the function of the human body. The science of metallurgy does not extend to stress corrosion yet. Solutions to stress corrosion problems, as are solutions to complex vibration problems, are more in the fom of an art than a science.

I do believe, however, that any readers who have factual data on the subject would be doing the Live Steamers in general a big favor to submit their information to LIVE STEAM Magazine for publication. I will be particularly interested since I have already invested a great deal of time and some expense in my stainless boiler, and if I find that tap water is a real hazard I will avoid it like the Black Plague! I have avoided tap water so far, but for the reason that I wanted to avoid the lime deposits such use will bring.

I hope that this information will remove some of the fears that some potential miniature boiler builders may have about using stainless. Mine is doing fine so far and I am glad I used 300 series stainless steel. Although certain grades are even better than others in the series, you can't do much better than with 321 welded with 316 rod.

Will let you know of any problems which show up in my loco since I am an inquisitive designer and I know that one positive way of finding out whether something will work or not is to build it and try it. We other way will ever advance the state of the art . . . theory must *always* be backed up by test!

I. DOUGLAS ALKIRE
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STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION
(Act of October 23, 1962; Section 4369, Title 39, United States Code)

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2. Mail subscriptions	1,298	1,822
C. Total paid circulation	1,346	1,905
D. Free distribution (including samples) by mail, carrier or other means	26	31
E. Total distribution (sum of C and D)	1,372	1,936
F. Office use, left over, unaccounted, spoiled after printing	369	564
G. Total (Sum of E & F — should equal net press run shown in A)	1,741	2,500

I certify that the statements made by me above are correct and complete.

William C. Fitz, Publisher

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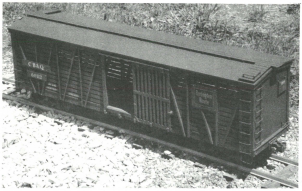
Jim Turnbull's big Beyer-Garrett (See cover) ran on the widest gauge, Stan Galloway and his 1" scale Hudson ran on the next size while Wally Scott and Claude Geoffrion ran on the trestle. Wally was trying out his brand new 4–8–4 on rails for the first time with success.

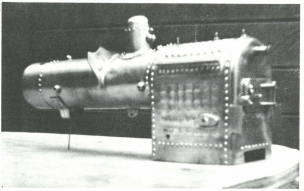
Things are still rather primitive but it is great fun to be running again after almost four seasons. We have to haul water, bring our own coal and use a 12-volt blower but next year we hope to be able to provide some conveniences!

PHOTO BY DAVE MULLINGS

On the new Montreal Live Steamers' track, Denis Tremblay operates Stan Galloway's 1" 4–6–4 with his nephew, Norman, on the dynamometer car; Dave Mulling's two sons, Mark and Paul, on the next car and Stan Galloway bringing up the rear.



NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS



1" SCALE CAR PARTS OFFERED

Good news for those interested in building 1" scale freight cars comes from Douglas E. Wagner, 906 Coach Road, Blackwood, N. J. 08012. Doug has available ¼ x ¼ L braces and ¼ x ¼ x ¼ Z braces in 12" lengths as shown on the cattle car as well as aluminum end frame castings with the coupler pocket and pulling pockets cast in the face and mounting tabs cast on the rear.

WOOD-SHEATHED CABOOSE DRAWINGS

Even if you don't plan to build a caboose, the new drawings offered by William Dykeman, 890 Bay Avenue, Bathurst, N. B., Canada, will make interesting study material. The blueprints from Canadian National drawings are prepared at ¼" scale and show all construction details and dimensions. $2.50 in funds of the country in which the order originates will bring the drawing, postpaid.

BOILER WORK AVAILABLE

If a boiler construction project keeps you from tackling a Live Steam engine, you might contact L. C. Stokes at Model Boilers, Box 178, Ventura, Calif. 93002 for assistance. His work covers all scales and gauges as exemplified by the 6" scale (half-size) boiler shown here which was built for Stephen Morunek of Vicksburg, Michigan, for his traction engine . . . and includes stationary and locomotive boilers as well.

...from the cupola

It's too bad that the day of soap operas has passed. They sure could have found meat for one in the continuing series of sob-stories that seem to plague this column. We would give anything to use these lines for more than a report on the current problems of LIVE STEAM, but it is the only way we can answer the countless letters asking, "Where's my last issue of LIVE STEAM?"

As we reported in the July issue, we had arranged for a local print shop to take some of the work load off us by handling the printing of LIVE STEAM. We were prepared to accept a little delay while he got used to our program and requirements but we felt it would benefit all in the long run. We were three weeks late with the June issue . . . but after three months of his "help" we were six weeks behind! When we called him to set up the schedule for the September issue we found he had "a big job" and didn't know when he could get to our work! Some frantic calls to our old plate supplier and our paper source got us back in the business of doing our own printing but a couple of 400-mile round trips to Pontiac for the plates and another to Grand Rapids for a trailer load of paper slowed us down and the September issue finally was mailed the week of October 21st . . . exactly two months behind our planned schedule.

Well, we've been beating this typewriter unmercifully during the past week with plans to be ready for plates by the middle of next week which would gain us one week on our schedule. As if to add insult to injury we just had a phone call from the plate maker advising that they would close down next Wednesday (just about the time we will have this issue ready for plates) for a week of deer hunting! Having lived with this situation for many years, we know it is of no avail to try another source! The same situation exists in all businesses . . . and if they don't close down, they won't have enough staff to do any work anyway. The epidemic of "buck fever" gets worse each year!

About all we will gain this month is a current explanation of the trials, tribulations and growing pains of LIVE STEAM!

—W. C. F.

THE EXTRA BOARD

Items for sale or wanted to purchase by hobbyists. One free ad included with subscription, additional ads 5¢ per word with order.

WANTED

Copy of LBSC's "Live Steam Book" which is now out of print. E. J. Pickard, R. D. #1, Willoughby, Ohio 44094.

8 lb. steel rail, any length and quantity. Also photos and post cards of yards trains from 12" to 24" – will trade photos. Leslie G. Tuttle, Box 558, Myrtle Beach, S. C. 29577.

Locomotives in ¾", 1" and 1½" scale. Also parts and accessories complete or incomplete. Please send details, photos and price to Benj. W. Sheppard, Jr., 878 Haddon Avenue, Collingswood, N. J. 08108.

Electric trains made before 1941. Will pay top cash. Also want Buddy-L push toys. Al Staufer, Route 4, Medina, Ohio 44256.

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Engineer will build 1½" scale British Tank locomotives and 6" scale Traction Engines. Second-hand locomotives for sale. Contact S. W. Pearse, Midtaphouse, Liskeard, Cornwall, England.

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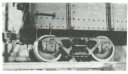

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...from the cupola

It's too bad that the day of soap operas has passed. They sure could have found meat for one in the continuing series of sob-stories that seem to plague this column. We would give anything to use these lines for more than a report on the current problems of LIVE STEAM, but it is the only way we can answer the countless letters asking, "Where's my last issue of LIVE STEAM?"

As we reported in the July issue, we had arranged for a local print shop to take some of the work load off us by handling the printing of LIVE STEAM. We were prepared to accept a little delay while he got used to our program and requirements but we felt it would benefit all in the long run. We were three weeks late with the June issue . . . but after three months of his "help" we were six weeks behind! When we called him to set up the schedule for the September issue we found he had "a big job" and didn't know when he could get to our work! Some frantic calls to our old plate supplier and our paper source got us back in the business of doing our own printing but a couple of 400-mile round trips to Pontiac for the plates and another to Grand Rapids for a trailer load of paper slowed us down and the September issue finally was mailed the week of October 21st . . . exactly two months behind our planned schedule.

Well, we've been beating this typewriter unmercifully during the past week with plans to be ready for plates by the middle of next week which would gain us one week on our schedule. As if to add insult to injury we just had a phone call from the plate maker advising that they would close down next Wednesday (just about the time we will have this issue ready for plates) for a week of deer hunting! Having lived with this situation for many years, we know it is of no avail to try another source! The same situation exists in all businesses . . . and if they don't close down, they won't have enough staff to do any work anyway. The epidemic of "buck fever" gets worse each year!

About all we will gain this month is a current explanation of the trials, tribulations and growing pains of LIVE STEAM!

—W. C. F.—

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